CLAIMS

WHAT IS CLAIMED IS:

1. An isolated and substantially purified DNA sequence comprising a sequence selected from the group consisting of SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and contiguous portions thereof.

2. The DNA sequence of claim 1, wherein said DNA sequence includes one or more variations selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

an A at nucleotide base number 4123 of SEQ ID NO:3;

a C at nucleotide base number 4368 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4790 of SEQ ID NO:3;

a T at nucleotide base number 4816 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a G at nucleotide base number 5055 of SEQ ID NO:3;

an A at nucleotide base number 5295 of SEQ ID NO:3;

an A at nucleotide base number 5695 of SEQ ID NO:3;

a T at nucleotide base number 7375 of SEQ ID NO:3;

an A at nucleotide base number 7759 of SEQ ID NO:3;

an A at nucleotide base number 8596 of SEQ ID NO:3;

base numbers 9603-9609 of SEQ ID NO:3 are absent;

an A at nucleotide base number 9892 of SEQ ID NO:3;

an A at nucleotide base number 9963 of SEQ ID NO:3;

an A at nucleotide base number 10132 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3;

a T at nucleotide base number 11091 of SEQ ID NO:3;

an A at nucleotide base number 11106 of SEQ ID NO:3;

a T at nucleotide base number 11774 of SEQ ID NO:3;

an A at nucleotide base number 12143 of SEQ ID NO:3;

a T at nucleotide base number 12145 of SEQ ID NO:3;

a G at nucleotide base number 14367 of SEQ ID NO:3;

base number 17028 of SEQ ID NO:3 is absent;

a T at nucleotide base number 17630 of SEQ ID NO:3;

a C at nucleotide base number 199 of SEQ ID NO:4;

a T at nucleotide base number 153 of SEQ ID NO:5;

an A at nucleotide base number 87 of SEQ ID NO:6;

a G at nucleotide base number 120 of SEQ ID NO:7; and

a C at nucleotide base number 221 of SEQ ID NO:8.

3. A DNA sequence of claim 2, wherein the contiguous portion of SEQ ID NO:3 contains a variation selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3; and

a T at nucleotide base number 12145 of SEQ ID NO:3.

4. A polynucleotide sequence that is complementary to a sequence selected from the group consisting of SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, and SEQ ID NO: 8, and contiguous portions thereof.

5. A hybridization probe comprising the polynucleotide of claim 4 and a detectable label.

6. A polynucleotide sequence that is complementary to SEQ ID NO:3, wherein SEQ ID NO: 3 contains one or more variations selected from the group consisting of

a T at nucleotide base number 4121;

an A at nucleotide base number 4123;

a C at nucleotide base number 4368;

a C at nucleotide base number 4621;

a T at nucleotide base number 4790;

a T at nucleotide base number 4816;

a T at nucleotide base number 4970;

a G at nucleotide base number 5055;

an A at nucleotide base number 5295;

an A at nucleotide base number 5695;

a T at nucleotide base number 7375;

an A at nucleotide base number 7759;

an A at nucleotide base number 8596;

base numbers 9603-9609 are absent;

an A at nucleotide base number 9892;

an A at nucleotide base number 9963;

an A at nucleotide base number 10132;

a C at nucleotide base number 11056;

a T at nucleotide base number 11091;

an A at nucleotide base number 11106;

a T at nucleotide base number 11774;

an A at nucleotide base number 12143;

a T at nucleotide base number 12145;

a G at nucleotide base number 14367;

base number 17028 is absent; and

a T at nucleotide base number 17630;

7. A hybridization probe comprising the polynucleotide of claim 6 and a detectable label.

8. A polynucleotide sequence that is complementary to SEQ ID NO:4, wherein SEQ ID NO: 4 contains a C at nucleotide base number 199.

9. A hybridization probe comprising the polynucleotide of claim 8 and a detectable label.

10. A polynucleotide sequence that is complementary to SEQ ID NO:5, wherein SEQ ID NO: 5 contains a T at nucleotide base number 153.

11. A hybridization probe comprising the polynucleotide of claim 10 and a detectable label.

12. A polynucleotide sequence that is complementary to SEQ ID NO:6, wherein SEQ ID NO: 6 contains an A at nucleotide base number 87.

13. A hybridization probe comprising the polynucleotide of claim 12 and a detectable label.

14. A polynucleotide sequence that is complementary to SEQ ID NO:7, wherein SEQ ID NO: 7 contains a G at nucleotide base number 120.

15. A hybridization probe comprising the polynucleotide of claim 14 and a detectable label.

16. A polynucleotide sequence that is complementary to SEQ ID NO:8, wherein SEQ ID NO: 8 contains a C at nucleotide base number 221.

17. A hybridization probe comprising the polynucleotide of claim 16 and a detectable label.

18. An expression system comprising a DNA sequence that corresponds to SEQ ID NO: 3.

19. The expression system of claim 18, wherein said expression system comprises a recombinant host cell transformed or transfected with said DNA sequence.

20. The expression system of claim 19, wherein said DNA sequence includes one or more of the variations selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

an A at nucleotide base number 4123 of SEQ ID NO:3;

a C at nucleotide base number 4368 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4790 of SEQ ID NO:3;

a T at nucleotide base number 4816 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a G at nucleotide base number 5055 of SEQ ID NO:3;

an A at nucleotide base number 5295 of SEQ ID NO:3;

an A at nucleotide base number 5695 of SEQ ID NO:3;

a T at nucleotide base number 7375 of SEQ ID NO:3;

an A at nucleotide base number 7759 of SEQ ID NO:3;

an A at nucleotide base number 8596 of SEQ ID NO:3;

base numbers 9603-9609 of SEQ ID NO:3 are absent;

an A at nucleotide base number 9892 of SEQ ID NO:3;

an A at nucleotide base number 9963 of SEQ ID NO:3;

an A at nucleotide base number 10132 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3;

a T at nucleotide base number 11091 of SEQ ID NO:3;

an A at nucleotide base number 11106 of SEQ ID NO:3;

a T at nucleotide base number 11774 of SEQ ID NO:3;

an A at nucleotide base number 12143 of SEQ ID NO:3;

a T at nucleotide base number 12145 of SEQ ID NO:3;

a G at nucleotide base number 14367 of SEQ ID NO:3;

base number 17028 of SEQ ID NO:3 is absent; and

a T at nucleotide base number 17630 of SEQ ID NO:3.

21. A method for diagnosing schizophrenia in a human, said method comprising:

obtaining from a patient a DNA sample comprising a RGS4 gene; and

detecting a variation in the RGS4 gene indicating schizophrenia.

22. The method of claim 21, wherein the detection of the variation comprises:

determining the sequence of the RGS4 gene in said sample; and

comparing said sequence to SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, and SEQ ID NO: 8.

23. The method of claim 21, wherein the detection of the variation comprises:

isolating said DNA sample;

hybridizing said DNA sample to a hybridization probe comprising SEQ ID NO:3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, or SEQ ID NO: 8, contiguous portions thereof, and a detectable label; wherein

the hybridization probe contains variations selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

an A at nucleotide base number 4123 of SEQ ID NO:3;

a C at nucleotide base number 4368 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4790 of SEQ ID NO:3;

a T at nucleotide base number 4816 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a G at nucleotide base number 5055 of SEQ ID NO:3;

an A at nucleotide base number 5295 of SEQ ID NO:3;

an A at nucleotide base number 5695 of SEQ ID NO:3;

a T at nucleotide base number 7375 of SEQ ID NO:3;

an A at nucleotide base number 7759 of SEQ ID NO:3;

an A at nucleotide base number 8596 of SEQ ID NO:3;

base numbers 9603-9609 of SEQ ID NO:3 are absent;

an A at nucleotide base number 9892 of SEQ ID NO:3;

an A at nucleotide base number 9963 of SEQ ID NO:3;

an A at nucleotide base number 10132 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3;

a T at nucleotide base number 11091 of SEQ ID NO:3;

an A at nucleotide base number 11106 of SEQ ID NO:3;

a T at nucleotide base number 11774 of SEQ ID NO:3;

an A at nucleotide base number 12143 of SEQ ID NO:3;

a T at nucleotide base number 12145 of SEQ ID NO:3;

a G at nucleotide base number 14367 of SEQ ID NO:3;

base number 17028 of SEQ ID NO:3 is absent;

a T at nucleotide base number 17630 of SEQ ID NO:3;

a C at nucleotide base number 199 of SEQ ID NO:4;

a T at nucleotide base number 153 of SEQ ID NO:5;

an A at nucleotide base number 87 of SEQ ID NO:6;

a G at nucleotide base number 120 of SEQ ID NO:7; and

a C at nucleotide base number 221 of SEQ ID NO:8.

24. A method of determining susceptibility to schizophrenia comprising:

obtaining from a patient a DNA sample comprising a RGS4 gene; and

detecting a variation in said RGS4 gene indicating susceptibility to schizophrenia.

25. The method of claim 24, wherein detecting the variation comprises:

determining the sequence of the RGS4 gene in said sample; and

comparing said sequence to SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, and SEQ ID NO: 8.

26. The method of claim 14, wherein detecting the variation comprises:

isolating said DNA sample;

hybridizing said DNA sample to a hybridization probe comprising SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, or SEQ ID NO: 8, contiguous portions thereof, and a detectable label; and

further wherein, the hybridization probe contains variations selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

an A at nucleotide base number 4123 of SEQ ID NO:3;

a C at nucleotide base number 4368 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4790 of SEQ ID NO:3;

a T at nucleotide base number 4816 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a G at nucleotide base number 5055 of SEQ ID NO:3;

an A at nucleotide base number 5295 of SEQ ID NO:3;

an A at nucleotide base number 5695 of SEQ ID NO:3;

a T at nucleotide base number 7375 of SEQ ID NO:3;

an A at nucleotide base number 7759 of SEQ ID NO:3;

an A at nucleotide base number 8596 of SEQ ID NO:3;

base numbers 9603-9609 of SEQ ID NO:3 are absent;

an A at nucleotide base number 9892 of SEQ ID NO:3;

an A at nucleotide base number 9963 of SEQ ID NO:3;

an A at nucleotide base number 10132 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3;

a T at nucleotide base number 11091 of SEQ ID NO:3;

an A at nucleotide base number 11106 of SEQ ID NO:3;

a T at nucleotide base number 11774 of SEQ ID NO:3;

an A at nucleotide base number 12143 of SEQ ID NO:3;

a T at nucleotide base number 12145 of SEQ ID NO:3;

a G at nucleotide base number 14367 of SEQ ID NO:3;

base number 17028 of SEQ ID NO:3 is absent;

a T at nucleotide base number 17630 of SEQ ID NO:3;

a C at nucleotide base number 199 of SEQ ID NO:4;

a T at nucleotide base number 153 of SEQ ID NO:5;

an A at nucleotide base number 87 of SEQ ID NO:6;

a G at nucleotide base number 120 of SEQ ID NO:7; and

a C at nucleotide base number 221 of SEQ ID NO:8.

27. A method for diagnosing schizophrenia comprising:

obtaining from a patient to be tested for schizophrenia a sample of tissue;

measuring RGS4 mRNA levels in said sample; and

determining if there is a reduced level of RGS4 mRNA in the sample.

28. A method of determining susceptibility to schizophrenia comprising:

obtaining from a patient to be tested for susceptibility to schizophrenia a sample of tissue;

measuring RGS4 mRNA levels in said sample; and

determining if there is a reduced level of RGS4 mRNA in the sample.

29. A method for diagnosing schizophrenia comprising:

obtaining from a patient to be tested for schizophrenia a sample of tissue;

measuring RGS4 protein levels in said sample; and

determining if there is a reduced level of RGS4 protein in the sample.

30. The method of claim 29, wherein measurement of the RGS4 protein levels comprises the utilization of an antibody that has been raised against RGS4 protein.

31. A method of determining susceptibility to schizophrenia comprising:

obtaining from a patient to be tested for susceptibility to schizophrenia a sample of tissue;

measuring RGS4 protein levels in said sample; and

determining if there is a reduced level of RGS4 protein in the sample.

32. The method of claim 31, wherein measurement of the RGS4 protein levels comprises the utilization of an antibody that has been raised against RGS4 protein.

33. A method of treating schizophrenia, said method comprising:

measuring RGS4 protein or mRNA levels in a patient; and

altering said RGS4 protein levels to provide the patient with an improved psychiatric function.

34. The method of claim 33, wherein said improved psychiatric function includes anti-psychotic effects.

35. The method of claim 33, wherein said method comprises prophylactic treatment.

36. A kit for diagnosing schizophrenia in a patient, said kit comprising:

antibodies to RGS4; and

a detector for ascertaining whether said antibodies bind to RGS4 in a sample.

37. The kit of claim 36, wherein the detector is an immunoassay.

38. A kit for diagnosing schizophrenia in a patient, said kit comprising:

a detector of RGS4 transcript levels in a patient; and

a standard to ascertain altered levels of RGS4 transcript in the patient.

39. The kit of claim 38, wherein the standard is an expression profile.

40. An isolated and substantially purified DNA sequence comprising a sequence selected from the group consisting of SEQ ID NO:3, SEQ ID NO:3 in which nucleotide base number 4121 is an T; SEQ ID NO:3 in which nucleotide base number 4123 is an A; SEQ ID NO:3 in which nucleotide base number 4368 is a C; SEQ ID NO:3 in which nucleotide base number 4621 is a C; SEQ ID NO:3 in which nucleotide base number 4790 is a T; SEQ ID NO:3 in which nucleotide base number 4816 is a T; SEQ ID NO:3 in which nucleotide base number 4970 is a T; SEQ ID NO:3 in which nucleotide base number 5055 is a G; SEQ ID NO:3 in which nucleotide base number 5295 is an A; SEQ ID NO:3 in which nucleotide base number 5695 is an A; SEQ ID NO:3 in which nucleotide base number 7375 is a T; SEQ ID NO:3 in which nucleotide base number 7759 is an A; SEQ ID NO:3 in which nucleotide base number 8596 is an A; SEQ ID NO:3 in which nucleotide base numbers 9603-9609 are absent; SEQ ID NO:3 in which nucleotide base number 9892 is an A; SEQ ID NO:3 in which nucleotide base number 9963 is an A; SEQ ID NO:3 in which nucleotide base number 10132 is an A; SEQ ID NO:3 in which nucleotide base number 11056 is a C; SEQ ID NO:3 in which nucleotide base number 11091 is a T; SEQ ID NO:3 in which nucleotide base number 11106 is an A; SEQ ID NO:3 in which nucleotide base number 11774 is a T; SEQ ID NO:3 in which nucleotide base number 12143 is an A; SEQ ID NO:3 in which nucleotide base number 12145 is a T; SEQ ID NO:3 in which nucleotide base number 14367 is a G; SEQ ID NO:3 in which nucleotide base number 17028 is absent; SEQ ID NO:3 in which nucleotide base number 17630 is a T; SEQ ID NO:4 in which nucleotide base

number 199 is a C; SEQ ID NO:5 in which nucleotide base number 153 is a T; SEQ ID NO:6 in which nucleotide base number 87 is an A; SEQ ID NO:7 in which nucleotide base number 120 is a G; SEQ ID NO:8 in which nucleotide base number 221 is a C; contiguous portions thereof; and perfect complements thereof.

41. The DNA sequence of claim 40, comprising SEQ ID NO:3 containing one or more of the variations selected from the group consisting of:

a T at nucleotide base number 4121 of SEQ ID NO:3;

a C at nucleotide base number 4621 of SEQ ID NO:3;

a T at nucleotide base number 4970 of SEQ ID NO:3;

a C at nucleotide base number 11056 of SEQ ID NO:3; and

a T at nucleotide base number 12145 of SEQ ID NO:3.

42. The DNA sequence of claim 40 further comprising a detectable label.

43. The DNA sequence of claim 41 further comprising a detectable label.

44. A transgenic mouse whose genome comprises a disruption of the endogenous RGS4 gene, wherein said disruption comprises the insertion of a transgene, and wherein said disruption results in said transgenic mouse not exhibiting normal expression of RGS4 protein.

45. The transgenic mouse of claim 44, wherein the transgene comprises a nucleotide sequence that encodes a selectable marker.